investments are assumed to be significantly lower than booked investments, the model systematically understates operating expenses.

6. Finally, the embedded factor approach used in the Hatfield Model will tend to overstate costs in areas that require higher investment costs but not necessarily higher operating expenses. For example, loop investments will vary by loop length and density. For low density rural areas, with higher average loop investments, the Hatfield Model will calculate correspondingly higher operating expenses. In my experience, I have not found that situation to be true. There are offsetting factors (no traffic control problems in rural areas) that cause similar average loop maintenance costs in rural and urban areas.

7. The Hatfield Model also incorrectly determines the cost factors it applies to investment for estimating operational costs, and it applies the factors incorrectly in a manner that underestimated costs. For example, in describing the Hatfield Model at the California Universal Service Workshops, AT&T/ MCI identified that the model uses a digital switching maintenance factor from a New England Telephone cost study for New Hampshire.[1] The Hatfield Model inappropriately uses this factor to calculate switch maintenance everywhere, including California.

8. Using the New Hampshire factor everywhere is wrong. The Hatfield Model acknowledges that switching investment varies by switch size (see page 38 of Hatfield documentation), with the largest investment per line occurring for switches with the smallest line size. Since New Hampshire is characterized by small towns with small switches, the Hatfield

[1] Elsewhere, the Hatfield Model uses Pacific Bell data for development of other maintenance cost factors. This is an example of the builders of the Hatfield Model selectively choosing their processes consistently to underestimate costs.

Model would identify these switches as having higher switching investments per line than would be the case for a state like California, with most lines in large switches in metropolitan areas. By deriving the switch maintenance factor from New Hampshire's high switch unit investment, the Hatfield Model creates a factor only for "small town" states like New Hampshire. The factor is clearly much to low for California with its cities and lower switch unit investment. Applying the low switch maintenance factor from New Hampshire to Pacific's lower per-line switch investment will, by necessity, underestimate the switch maintenance costs of Pacific Bell.

9. FCC ARMIS data bear out that the Hatfield Model's switch maintenance expense factor and reliance on New Hampshire data results in a completely unreliable estimate of switching maintenance expense. The Hatfield Model uses a digital switch maintenance factor of 0.027 from a 1992 study for New Hampshire. The 1993 ARMIS data (Figure A, below) shows that the average RBOC had a Digital Switch Maintenance factor of 0.058, while Pacific's was 0.054. The New Hampshire factor clearly has no relevance for Pacific Bell.

10. AT&T /MCI claimed to have verified the switch maintenance factor by comparing it with data reported by U S West, another company with a significant portion of its customer base in small communities. AT&T / MCI claimed in the California workshops that the low switch maintenance factor from New Hampshire was due to efficient operations (as opposed to higher per-line investments), yet the factor from the 1993 ARMIS report for New York Telephone, the sister company of New England Telephone in NYNEX, had a factor of 0.053. If the factors represented relative efficiency, then both New Hampshire's and New York's factors should be equal as NYNEX could be expected to be equally efficient in each of its state operations.

11. The problems with the Hatfield Model switching maintenance calculations are further exacerbated by the Hatfield Model's method of estimating incremental switching investment. As I describe below, the Hatfield Model grossly understates Pacific's switching investment. By applying the inappropriately low switching maintenance expense factor to a significantly understated investment, the Hatfield Model compounds its error and understates switching maintenance costs even more.

FIGURE A

1993 ARMIS Data -- Analysis of Digital Switch Maintenance To Digital Switch Investment

Company	Expense	Investment	Factor
All LECs	2,206,401	39,119,365	0.056
All RBOCs	1,615,720	27,664,686	0.058
All Other LECs	590,681	11,454,679	0.052
Illinois Bell	95,815	1,276,012	0.075
Michigan Bell	72,059	1,008,400	0.071
Bell of PA	82,146	1,193,931	0.069
New Jersey Bell	65,483	1,092,997	0.060
Bell South	346,624	5,310,713	0.065
New England Tel	73,949	1,880,782	0.039
New York Tel	182,597	3,445,909	0.053
Pacific Bell	159,274	2,933,710	0.054
Southwestern Bell	149,817	2,411,316	0.062
US West	121,877	3,270,438	0.037
GTE Calif.	96,311	1,627,242	0.059

12. There are other examples of the Hatfield Model incorrectly determining the cost factors it applies to investment. I cannot determine from the material submitted if this error has been corrected in the latest version, but in the prior version the Hatfield Model incorrectly determined the cost for buried cable maintenance. Instead of applying a buried cable maintenance factor to the buried cable investments developed in the model. The model applied a factor for

underground cable maintenance. Since the factor for underground cable maintenance (0.031) is significantly lower than the factor for buried cable maintenance (0.068), the Hatfield Model deviates from its own process in order to understate buried cable maintenance by more than half.

13. The Hatfield Model inappropriately mixes cost inputs from inconsistent and inappropriate sources. For example, as previously discussed, the model uses embedded cost factors to estimate incremental costs. It uses Pacific Bell data to develop all its embedded cost factors except for digital switch maintenance, where it uses a factor derived from New Hampshire data. Furthermore, the New Hampshire factor is an embedded factor that was adjusted in the New Hampshire study by an unexplained book-to-current cost ratio. This book-to-current cost factor reduced the actual New Hampshire cost factor. The Hatfield Model uses this adjusted factor without attempting to explain or justify that the factor is appropriate even through it produces results significantly below reported digital maintenance expenses.

14. In the area of customer service costs, the Hatfield Model also uses data from the New Hampshire study. However, the New Hampshire study is not a TSLRIC study. The costs in the New Hampshire study appear to be the marginal costs incurred with a 10% change in volume. This approach violates costing principles agreed to by AT&T and MCI in California (Consensus Costing Principles Principle No. 3 -- The increment being studied shall be the entire quantity of the service provided, not some small increase in demand).

15. The overhead factor in the Hatfield Model is another example of using inconsistent and inappropriate inputs. (The builders have changed the name from overhead factor to variable support factor in this latest version.) TSLRIC studies do not include an overhead factor. By

including an overhead factor, the model produces fully distributed costs not TSLRIC results. However, if AT&T intends for the overhead factor to represent a reasonable contribution to shared and common costs, then the factor is too low. At page 49 of the model documentation AT&T /MCI claim that "variable support expenses for LECs are higher than those of similar industries .... such as the interexchange industry." This is not true. Data from 1993 FCC ARMIS reports show that the embedded overhead factor for all LECs was 0.134. The factor for the RBOCs was 0.116. The factor for AT&T was <u>0.177</u>. That is nearly twice the factor used by AT&T/ MCI in the Hatfield Model. Also, as with every other cost factor in the model, factors based on embedded costs are inappropriately applied to incremental costs resulting in a meaningless value that is neither fish nor fowl.

16. The Hatfield Model understates depreciation expenses by assuming unreasonably long economic lives for investments. The prior version of the Hatfield Model used a single eighteen year life assumption for all investments. It made no distinction between the economic life of a building, a central office switch, a computer on an employee's desk, or the vehicles employees use. This latest version varies the life assumption by type of investment. However, these new lives appear to result in a weighted average of about eighteen years, perhaps even a little longer. An eighteen year service life equates to a depreciation rate of 5.55%. For comparison, the CPUC composite depreciation rate approved for Pacific is 6.9%, nearly 25% higher than the AT&T/ MCI selected rate. However, neither the depreciation lives in the Hatfield Model nor those currently approved by the CPUC are appropriate for a TSLRIC proxy model. Those depreciation rates reflect the influences of a regulatory process that historically kept depreciation rates low and extended capital recovery into future years, beyond the economic lives of the equipment. Any proxy cost model intended to encourage efficient competition should reflect economic lives

consistent with fully competitive markets. Those lives should reflect the competitive effects on economic lives caused by PCS, cable television and CLC entry into the market. In our TSLRIC studies, we used the economic lives from our recent writedown of assets. Compared to the 18 year life assumption in the Hatfield Model, the weighted average economic life used by Pacific is 12.2 years. To test the reasonableness of the lives we use compared to the Hatfield Model assumptions, the FCC could request from TCG, MFS, Time Warner, MCI Metro, and all the other new entrants information on the economic lives they use in their financial reports. Finally, in addition to understating economic lives the Hatfield Model incorrectly omits salvage and cost of removal from the calculation of depreciation expense.

17. The Hatfield Model consistently underestimates the long run incremental investment required to provide network services. For example, the Hatfield Model significantly understates long run incremental switching investment. In a long run incremental cost study, investments must reflect long run expected values. This the Hatfield Model fails to do.

18. With switching equipment, or any other technology-dependent equipment, prices vary over the life of the technology, even when adjusted to eliminate the effects of inflation. By definition, a long run incremental analysis must capture the overall effect of all life cycle price variations; something the Hatfield Model fails to do. For switch prices to a large local exchange carrier such as Pacific, the price variations have the following pattern:

a. When a new technology, such as today's digital switch, is first introduced, the price is relatively high, as the new technology provides advantages over existing technology, and the initial vendor(s) is able to charge a premium for the advanced capability.

b. As more vendors enter the market, providing competitive equipment, prices will drop, but will still reflect the premium value associated with the advanced features of the new technology.

c. At some point, the new technology will become the standard, and the older technology will have ceased to be produced. During this period, switch vendors offer to provide under contract large numbers of switches, associated with replacing a large number of existing older technology switches, at significant price discounts. These discounted prices are often limited to the replacement of the older technology, and do not extend to future growth additions to the new technology. (This is the current stage of pricing for digital switches.)

d. After the replacement of the older switches has been completed, the switch replacement contracts will expire, and vendor switch prices will rise back to levels more commensurate with the relatively low volumes of purchases required to only meet growth demands (as all of the older technology switches have been replaced).

e. The last phase is late in the life of the technology, after a newer replacing technology appears, when the price of the now older technology increases rapidly as vendors exit that market.

19. The Hatfield Model uses understated current prices as the expected long run incremental investment. The Hatfield Model fails to recognize that today's current digital switch prices, even if correctly stated, are themselves significantly lower than the long run expected values of those prices for the reasons explained above (current prices are at stage c, the lowest in the life of the technology). By using its understatement of current digital switch prices, and by

failing to recognize the long term pattern of price variations for digital switching equipment, the Hatfield Model grossly understates the average switching investment. For Pacific Bell, the Hatfield Model predicts a total digital switching investment of $2,838 million. This is obviously wrong since Pacific's actual digital switching investment was already $3,370 million in 1994, even though about 35% of Pacific's lines were still being served by older analog switches. The Hatfield Model thus starts its investment driven cost estimation process with one of its basic inputs, switching investment, at probably little over half (about 54%) of Pacific's projected long run incremental switching investment. By using as its switching investment input such a small fraction of Pacific's likely long run incremental switching investment, the Hatfield Model cannot help but grossly understate capital costs and the operational expenses it derives by applying embedded cost factors to that investment.

20. The switching investment values used in this latest version of the Hatfield Model contradict statements and testimony by witnesses representing AT&T in just concluded California Universal Service Hearings. In February, the Hatfield Model presented in California used the same switching investment information presented in this proceeding (see Hatfield Model documentation pages 37 and 38). However, in April, AT&T presented revised Hatfield digital switching investments admitting that the earlier values were understated and that the switching investment inputs of the model needed to be increased by $60 per line. These higher values were used by witnesses representing AT&T in hearings that concluded on May 17.

21. In California during an April workshop meeting, an admission made by the builders of the Hatfield Model helps explain how the conflict in the switching data could have occurred. April revisions (new logic and associated inputs) made to the model that are also in the latest

version in this proceeding used place holder input data (best engineering estimates by Hatfield employees) pending development of actual sources by other consultants working for AT&T. Those place holder inputs were never replaced in California and remain in the latest version submitted in this proceeding.

22. The Hatfield Model consistently underestimates the long run incremental loop investment. The builders of the Hatfield Model acknowledge that the loop investment modules (HM-LIM) within the model understate investments and that patches must be added to other modules within the Hatfield Model to correct for the errors. The HM-LIM have a number of problems which causes the Hatfield Model to improperly calculate incremental loop investments.

23. In our Comments, we identified and discussed many of these problems. A summary of those problems is that the modules do not model the way distribution plant is actually engineered and placed. In addition, they omit a lot of loop investments. The Hatfield Model attempts to rectify some of the HM-LIM problems of missing drop, terminal and SAI investments within other modules. It does not, however, make any adjustments for other missing costs such as engineering costs and cable splicing costs. The more fundamental HM-LIM problems and shortcomings are carried over into the Hatfield Model. The loop modules were never intended, and therefore lack the sophistication necessary, to develop TSLRIC proxies for unbundled loops.

24. The builders of the Hatfield Model clearly acknowledge the problems with the HM-LIM and indicate that this latest version selectively increases the HM-LIM structure costs in sparsely populated areas (documentation, page 14). This is a new modification, unlike the version used in California, and the filed documentation is insufficient to explain it. This latest adjustment does raise a significant concern. What data did the builders rely upon to determine the size of the

investment why do they continue to incorporate the HM-LIM modules in the Hatfield Model? Hatfield should construct a new loop investment module, instead of putting patches upon patches in the current module.

25. As an example of the significant understatement in loop investment that occurs in the Hatfield/HM-LIM, the following table (Table 2) compares loop investments for Pacific Bell as determined by the Hatfield Model (the April version) and by the CPM submitted in California:

TABLE 2
LOOP INVESTMENT COMPARISON

	Unit Investment	Hatfield Model Estimates per line	CPM Per line	Total Hatfield Model Understatement
1	Feeder - Total	$ 25.79	$ 87.69	$ 569 Million
2	Distribution - Total	$ 131.78	$ 235.54	$ 522 Million
3	Support Structure	$ 0	$ 90.91	$ 875 Million
4	Drop	$ 40.00	$ 50.55	$ 107 Million
5	Loop Electronics	$ 85.89	$ 139.69	$ 529 Million
	Total Loop Investment	$283.46	$604.38	$ 2,602 Million

The most noticeable difference is that the Hatfield understates investments for <u>every</u> type of plant. The single largest difference is that the Hatfield Model assigns <u>no</u> investment for support structure to the loop. In California, AT&T claimed that support investment was a shared cost, shared between access line services and other services such as leasing of conduit space and other unspecified services.

26. In the loop investment calculation, the Hatfield Model assumes that all loops, business, Centrex, private line, special access and residence in the area have the same investment (the average loop investment of the area). Pacific's TSLRIC studies indicate the distribution plant portion of residence loops tends to be significantly longer than the distribution plant portion of business loops (more than 70% longer). Additionally, the associated distribution plant costs of the buried terminals and drops of residential service loops are costs not offset by lower cost business service loop equivalents. The net effect is that the distribution plant and related costs for residential service loops are more than 70% more costly than for business service loops. In our TSLRIC loop studies, this difference accounts for three fourths of the $40 annual capital cost difference between business and residence service loops. As these cost differences are relatively independent of study area differences, the effect of the Hatfield Model's averaging of the loop investments across all loops is to significantly overstate the investment for a business loop and to significantly understate the investment for a residence loop in the same study area. In the calculation of distribution cable the Hatfield Model imputes economies of scale that simply do not exist. Centrex customers do not locate in the middle of residential housing subdivisions.

II. The Cost Proxy Model

27. Pacific Bell's Universal Service Cost Proxy Model (CPM) can be modified (like the Hatfield Model) to calculate estimates of unbundled network functions that are superior to the Hatfield Model in accurately estimating costs for the following reasons:

a. The expenses input to the Cost Proxy Model are estimated expenses per line or unit that can reflect the best available data for each company, not estimates derived by applying factors from embedded cost relationships, expenses for New Hampshire in 1992, or overhead factors that have no place in a TSLRIC study.

b. The investments input to the Cost Proxy Model reflect forward looking engineering guidelines for placing equipment, and appropriate long run equipment prices charged by equipment vendors, not estimates derived from other states or short term special price discount deals.

c. The inputs into the Cost Proxy Model reflect Total Service Long Run Incremental Cost study principles adopted by the CPUC (D. 95-12-016, Appendix C), not embedded costs, short-run marginal cost, fully distributed costs, or other cost studies values determined using unknown principles.

d. The non-proprietary version of the CPM relies on data from commercial databases and other public sources. The logic in the model is open, not locked in place by the developers as in the loop modules of the Hatfield Model.

III. The Revenue Effects of Pricing Services at TSLRIC

28. As described above, I direct studies of Pacific Bell's costs for filing with the CPUC. Specifically, I recently studied and submitted the total service long run incremental costs (TSLRICs), including identifying shared and common costs of the business. Based on that analysis, I have concluded that if all regulated services were to be priced at TSLRIC, then the resulting shortfall of coverage for the total costs of the business would cause a substantial decline in rates of return, both interstate and intrastate.

29. In 1995, Pacific's reported rates of return within California were:

Interstate	Intrastate
15.12%	8.06%

30. If all regulated services (including residential rates which would need to be increased since those rates are currently below TSLRIC) were priced at TSLRIC then the rates of return would have been:

Interstate	Intrastate
1.52%	(5.01%)

32. If residential rates were held constant at the current level, then the resulting shortfall caused by pricing all other regulated services at TSLRIC would be even greater. The resulting rates of return would be:

Interstate	Intrastate
1.25%	(7.28%)

33. I declare under penalty of perjury that the foregoing is true and correct. Executed on May 28, 1996, at San Ramon, California.

Richard L. Scholl